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Investigation of intravenous Hydroxocobalamin compared to Hextend® for resuscitation in a swine model of uncontrolled hemorrhagic shock: a preliminary report

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Background

Previously we reported that intravenous (IV) hydroxocobalamin is as effective as IV Hextend® in improving systolic blood pressure (SBP) in a controlled hemorrhagic shock model. We aimed to compare IV hydroxocobalamin (HOC) to Hextend® using an uncontrolled hemorrhage model. Non-compressible wounds are difficult to treat. An ideal resuscitative fluid would be a small volume, portable drug that improves blood pressure and survival.

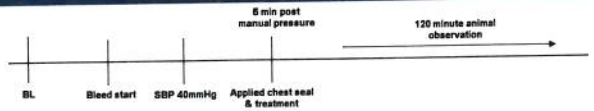
Objective

To compare systolic blood pressure over time in swine that have undergone hemorrhagic shock induced by lethal groin injury.

Methods

Experiment: 12 swine, 45-55kg were anesthetized, intubated, and instrumented with continuous femoral and pulmonary artery pressure monitoring. A groin injury was created by surgically exposing and transecting a femoral artery and vein. A suction catheter connected a canister placed distal to the wound measured blood loss. Swine were bled to a SBP of 40 mmHg then packed with QuikClot followed by 5 minutes of manual pressure. A chest seal was then applied. Animals were randomized to receive 150 mg/kg IV HOC, or 500 mL of Hextend® and monitored for 120 minutes.

Methods cont.

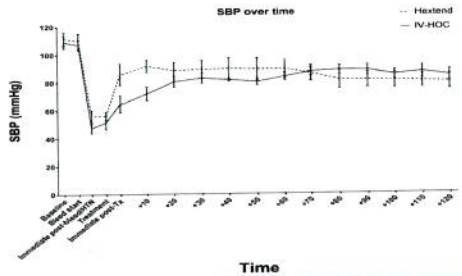


Statistics: A sample size of 9 animals per group was determined based on a power of 80% and an alpha of 0.05 to detect an effect size of at least 0.25 difference (1SD) in SBP between groups. Data were analyzed using repeated measures MANOVA. Data collection is ongoing.

Results

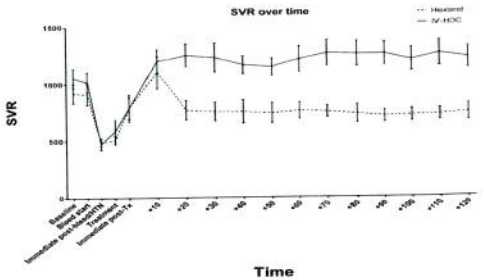
There were no significant differences between the HOC or Hextend groups at baseline or at shock (SBP 52 vs. 59 mmHg), nor was there a significant difference in blood loss from the injury (1005 vs 1100 mL). There was a significant difference by time between groups ($p<0.5$) post treatment. No significant difference in SBP, MAP or HR between groups. SVR was significantly higher and CO significantly lower in the HOC compared to Hextend® treated animals.

Graph 1. SBP for IV HOC vs. IV Hextend®

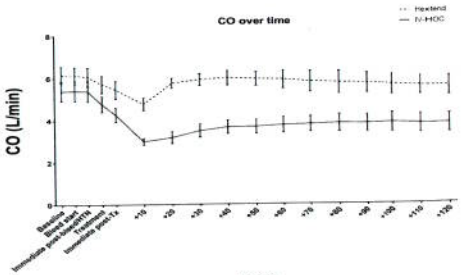


Results Continued

Graph 2. SVR for IV HOC vs. IV Hextend®



Graph 3. CO for IV HOC vs. IV Hextend®



Limitations

Animal model
Not blinded

Conclusions

IV HOC was as effective as Hextend® in supporting SBP in an uncontrolled hemorrhagic shock model. HOC resulted in an statistically significant increase in SVR and decrease in CO.

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